April 19, 1927. 1,625,182

J. A. ZUBLIN

RECIPROCATING PUMP

Filed March 29, 1924 2 Sheets-Sheet 1

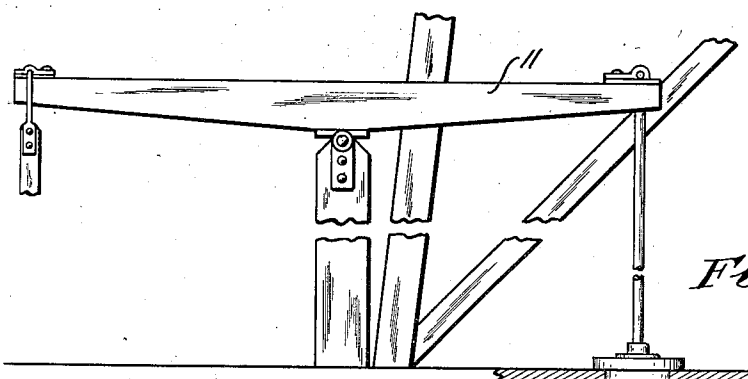


Fig. 1.

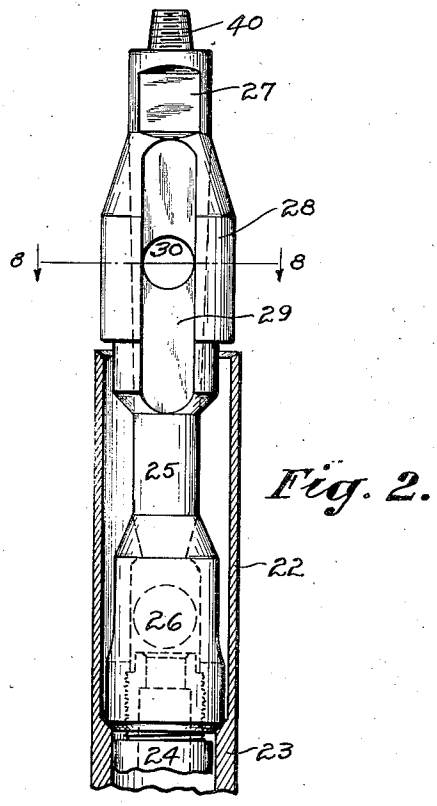
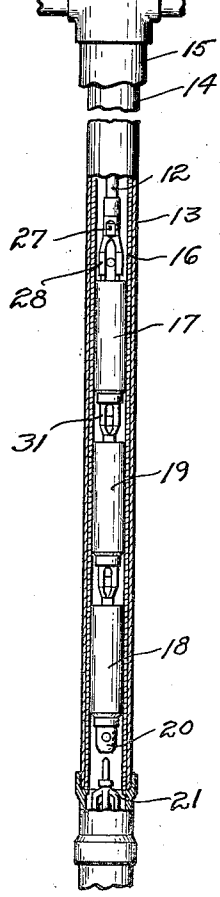


Fig. 2.



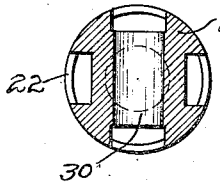


Fig. 8.

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RECIPROCATING PUMP

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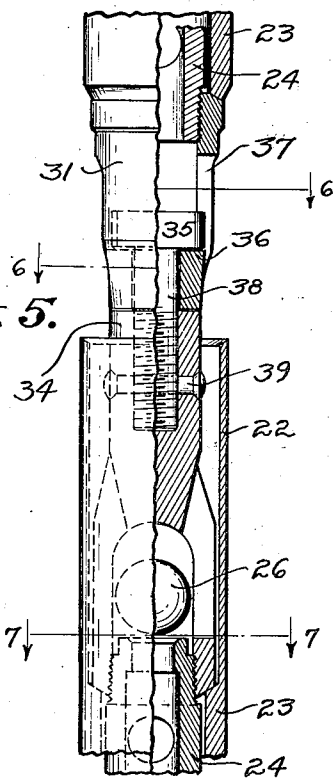


Fig. 5.

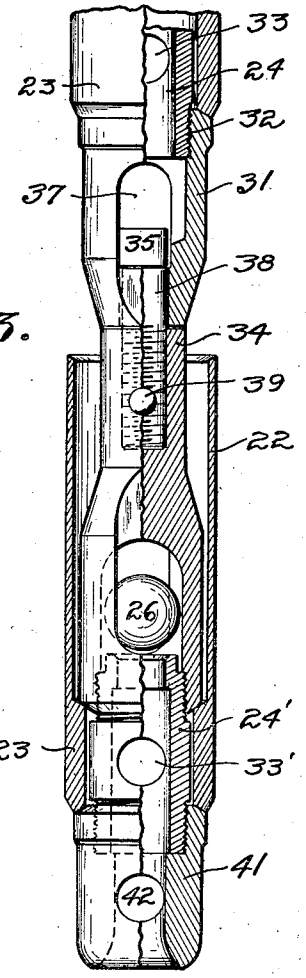


Fig. 3.

Fig. 6.

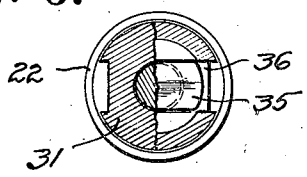


Fig. 4.

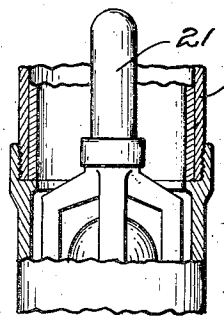
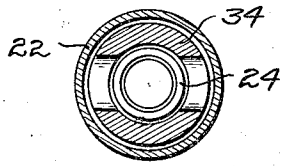


Fig. 7.



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Patented Apr. 19, 1927. 1,625,182

UNITED STATES PATENT OFFICE.

JOHN A. ZUBLIN, OF LOS ANGELES, CALIFORNIA.

RECIPROCATING PUMP.

Application filed March 29, 1924. Serial No. 702,792.

My present invention relates to reciprocating pumps suitable for heavy duty; and it is an especial object of this invention to provide a reciprocating pump having a novel plunger formed in sections flexibly connected.

It is a further object of this invention to provide a sectional plunger, whose respective sections are provided with transverse openings, adapting the same to be easily connected or disconnected without requiring the use of a wrench.

It is a further object of this invention to provide a sectional plunger each of whose sections may comprise a novel cup or lifting element suitably bevelled and secured by merely clamping the same between a pair of connecting elements; and, in a preferred construction, the mentioned connecting elements may have threaded connection with a valve seat, and one of said connecting elements may serve additionally as a cage for a ball valve.

It is a further object of my invention to provide, in a general organization of the character referred to, means permitting the use of any desired number of plunger sections in a vertical series, the uppermost connecting element being provided with a head serving as a guard and with means for attachment to a sucker rod, and the lowermost section being optionally provided with means for driving a standing valve into a suitable seat.

It is a further object of my invention to provide a complete pump of an exceptionally rugged, economical and efficient type utilizing certain features of the invention disclosed in an application, Serial No. 692,514, filed Feb. 13, 1924, by myself jointly with Willard L. Borough, and entitled Reciprocating pump with individual joints between plungers.

Other objects of my invention will appear from the following description of an advantageous embodiment thereof, taken in connection with the appended claims and the accompanying drawings, in which

Fig. 1 is an elevational view, with parts in section, showing a general organization in which my novel pump may advantageously be employed.

Fig. 2 is an enlarged detailed vertical sectional view of the upper portion of a plunger such as is shown in Fig. 1.

Fig. 3 is a similar view of the lower portion of the same plunger.

Fig. 4 is a similar view disclosing a standing valve adapted to be seated by a plunger such as is shown in Fig. 3.

Fig. 5 is a view corresponding to the upper portion of Fig. 3, but taken at right angles thereto.

Figs. 6 and 7 are respectively horizontal sectional views taken substantially on the lines 6—6 and 7—7 of Fig. 5.

Fig. 8 is a horizontal sectional view taken substantially on the line 8—8 of Fig. 2.

Referring to the details of that specific embodiment of my invention chosen for purposes of illustration, 11 may be a walking beam employed to reciprocate a pump rod 12 within a cylinder 13 at or near the lower end of a usual string of tubing 14, supported within a casing 15, extending from the top of a well; and the cylinder 13, whether or not it consists of an ordinary section of tubing, may be provided with an entire or sectional lining 16 engaged by the respective sections of my novel pump plunger.

Although, my novel plunger may be made in any desired number of sections, I have shown in Fig. 1 a plunger comprising an upper section 17, a lower section 18, and an intermediate section 19; and it should be understood that any desired number of such intermediate sections may be employed or that an upper section 17 may be connected directly to a lower section 18, and also that the lower section 18, instead of being provided with valve-lifting means, may be provided with a head 20 for seating a valve 21, as shown. Each section of a plunger embodying my invention may comprise a lifting element or cup 22, whose base 23 may surround a valve seat 24; and said cup may in the case of the upper plunger section, be retained in its indicated relationship to said seat by engagement with an upper connecting element 25, shown as threaded upon said valve seat and as constituting a cage for a ball valve 26. The upper end of the connecting element 25 may be provided with means such as a pin 40 and a squared or flattened section 27 to facilitate its connection with or disconnection from a sucker rod; and it may also be provided with a guard head 28 having substantially vertical channels 29, to permit an upward move-

ment of oil past said head, and a transverse opening 30, to permit the insertion of a bar in the tightening or loosening of the joints by which the parts of my plunger may be connected. The head 28 may protect, during the upward withdrawal of a piston, an inwardly bevelled sand-guiding edge at the top of a cup 22, said bevelled edge being preferably inwardly inclined at an angle of about 30 degrees from a horizontal.

Secured to the lower end of the valve seat 24, and cooperating with the connector 25 in clamping a cup 22 in its indicated relationships, I may employ an intermediate connector comprising two parts capable of both a relative pivotal movement and a relative offsetting or lateral movement. The upper element 31 of the mentioned intermediate connector may have a threaded engagement at 32 with the valve seat 24, or its equivalent, and this valve seat may be provided with a transverse aperture 33, adapted to permit the use of a bar in the manner referred to. The upper element 31 of an intermediate connector may be secured to a lower element 34 thereof by means comprising a transverse pin 35, shown as rigidly connected with the lower connecting element 34 and as engaging shoulders 36 at the lower limit of an aperture 37 extending transversely of the upper connecting element 31. The pin 35, or its equivalent, may be integral with a body 38, threaded into the connecting element 34 or secured by means of a rivet or bolt 39; and I may optionally employ both the threaded connection and the bolt or rivet mentioned, in a manner permitting a readjustment of parts in such a way as to compensate for wear.

The lower element of each intermediate coupling may, in turn, have threaded engagement with a valve seat 24′, shown as provided with a transverse aperture 33′; and the lowest cup of all may optionally be secured against downward movement by means of a hollow bumping or valve-seating element 41, shown as threaded to the lower end of a valve seat and as provided with a transverse aperture 42.

In operation, whether or not a standing valve 21 is initially set by means of a plunger provided with a bumping element of the character referred to, it will be understood that, during the reciprocation of a plunger such as I have described, oil being free to move relatively upward through the various longitudinal or other openings disclosed, the ball valves may be simultaneously unseated in the usual manner during the descent of my plunger, the upward movement of the plunger being effective to lift the oil; and, during these movements, the respective plunger sections comprising cups or lifting elements 22 may independently adapt themselves to any irregularity in those portions of the cylinder within which they may respectively be moving, suitable clearances to permit either a lateral offsetting or a pivotal movement being provided on all sides of the transverse pin 35, or its equivalent, by which the upper and lower elements of the intermediate connectors are secured against undue relative longitudinal movement. This avoids undue strains and, like the mentioned bevelling, avoids undue wear. The mentioned transverse apertures in all of the threaded parts comprised in my novel plunger are so positioned as to permit the ready assembly or the disassembly of the same without requiring the use of a wrench; and, by obviating the need for threads on the inwardly bevelled lifting elements or cups, I am enabled to use therein a very hard and durable steel or other material.

Although, I have herein described one complete embodiment of my invention, it will be understood that various features thereof might be independently employed and also that various modifications might be made by those skilled in the art, without the slightest departure from the spirit and scope of my invention, as the same is indicated above and in the following claims.

I claim as my invention:

1. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; and flexible connection means connecting said plunger sections and including valve seats.

2. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; flexible connection means connecting said plunger sections and including valve seats; and valves retained by said connection means.

3. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; flexible connection means connecting said plunger sections and including valve seats; and valves retained by said connection means, said connecting means including a guard head at the top thereof, said guard head having vertical channels.

4. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; and flexible connection means connecting said plunger sections, said plunger sections being non-threadedly held by said connection means.

5. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; and flexible connection means connecting said plunger sections and including threadedly secured sections having valve seats formed therein.

6. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; and flexible connection means con-

necting said plunger sections and including threadedly secured sections having valve seats formed therein and having transverse apertures for the insertion of a bar to screw or unscrew the same.

7. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; flexible connection means connecting said plunger sections and including valve seats; and valves retained by said connection means, said connection means including a guard head at the top thereof, said guard head having vertical channels and having a transverse aperture for the insertion of a bar therein.

8. In a reciprocating pump: a plurality of plunger sections, each including a lifting element; flexible connection means connecting said plunger sections; a standing valve cage; and means adjacent the lowermost of said plunger sections for seating said valve cage.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 17th day of March, 1924.

JOHN A. ZUBLIN.